



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/649,577	08/26/2003	Douglas A. Hawks	050324-1161	5977
24504	7590	07/22/2005	EXAMINER	
THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP 100 GALLERIA PARKWAY, NW STE 1750 ATLANTA, GA 30339-5948			TRINH, MICHAEL MANH	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 07/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/649,577

Applicant(s)

HAWKS ET AL.

Examiner

Michael Trinh

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 16-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 16-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/1/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Art Unit: 2822

DETAILED ACTION

*** This office action is in response to Applicant's RCE and Amendment filed on May 16, 2005. Claims 1-8,16-27 are pending with newly added claims 17-27. Claims 9-15 were canceled.

*** The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

1. Claim 22 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 22 recites "said die attach pad". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

2. Claims 1-6,16,18,20-24,26 are rejected under 35 U.S.C. 102(e) as being anticipated by Glenn (6,247,229).

Glenn teaches (at Figs 2-9; col 3, line 18 to col 4; Fig 1, cols 5-6); a method for forming a package for an electrical device, the method comprising the steps of attaching a removable material 10 to a surface of a conductive material 13 before one or more isolated conductive features have been formed within the conductive material (Fig 2, col 3, lines 38-53, 18-67); forming isolated conductive features 24,20 within said conductive material 13 (Figs 3-4; col 4, lines 1-29); attaching encapsulant 32 to said isolated conductive features 24,20 and said removable material 10 (Fig 6, col 4, lines 48-67); and removing said removable material 10 from said conductive features 24,20 and said encapsulant 32 (Fig 7; col 5, lines 49-67). Re claim 2, wherein said forming step includes patterning a surface of said conductive material 13 with a material resistant of photoresist to an etchant and etching said conductive material 13 with said etchant (col 3, lines 54-67). Re claim 3, wherein a die attach pad 20 is formed within said conductive material 13 (Figs 3-4; col 4, lines 1-24). Re claim 4, wherein the device 28 is coupled to said die attach pad 20 (Fig 5; col 4, lines 30-41). Re claim 5, wherein an input/output portion of the device 28 is electrically coupled to said isolated conductive feature 24 (Figs 5,10, col 4, lines 35-41). Re claim 6, wherein the method further comprises the step of singulating individual packaged devices (Figs 8-9; col 6, lines 4-60). Claim 16, wherein the removable

Art Unit: 2822

material 10 is used and acted as a molding stencil during molding of encapsulant 30 (Figs 6-7; col 4, lines 48-67). Re claim 18, wherein removing the material 10 is performed prior to a singulation process to separate the package (Figs 6-8; col 5, line 61 through col 6, lines 24). Re claim 20, wherein the conductive material 13 comprises a metal frame sheet (Figs 2-4; col 3, lines 39-65). Re claim 21, wherein the conductive material 13 comprises a metal frame sheet 13 for leadframe having leads 24 (Figs 2-4, col 3, lines 39-45). Re claim 22, insofar as understood, die attach pad 20 is not offset from the isolated conductive features 24 (Figs 3-4; col 1, lines 1-29). Re claim 23, wherein a single row of connectors 24 is formed around perimeter of the leadframe (Figs 2-4; col 3, line 39 through col 4, line 45). Re claim 24, wherein the metal frame comprise a metal sheet (Figs 2-4; col 3, lines 39-65). Re claim 26, wherein the removable material 10 covers substantially the entire bottom surface of the metal frame sheet 13 (Figs 2-3).

3. Claims 1,3-6,16 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamaguchi (6,166,430).

Yamaguchi teaches (at Figs 1-6, 7a to 9f; col 6, line 40 through col 16) a method for forming a package for an electrical device, the method comprising the steps of attaching a removable material 12 to a surface of a conductive material 16,15 before one or more isolated conductive features 14,9 have been formed within the conductive material (Fig 4, lines 45-54; and Fig 3; col 8, lines 34-44); forming isolated conductive features 14,9 within said conductive material 16,15 (Figs 3-4; col 8, lines 45-67); attaching encapsulant 19 to said isolated conductive features 14,9 and said removable material 12 (Figs 5c,7d,9d; col 9, lines 32-67; col 11, lines 1-40); and removing said removable material 12 from said conductive features and said encapsulant 19 (Figs 7d-7e,9d-9e; col 11, lines 41-52). Re claim 3, wherein a die attach pad 14 is formed within said conductive material 16,15 (Figs 1,3,4; col 6, lines 40 through col 7; col 8, lines 45-67). Re claim 4, wherein the device 17 is coupled to said die attach pad 14 (Figs 5a-5b; 7b-7f; col 9, lines 32-53; col 10, lines 59-67). Re claim 5, wherein an input/output portion of the device 17 is electrically coupled to said isolated conductive feature 9 (Figs 7c-7f,6; col 10, lines 20-34; col 10, line 63 through col 11). Re claim 6, wherein the method further comprises the step of singulating individual packaged devices (Figs 7e-7f; col 11, lines 53-67; col 7, lines 17-22). Re claim 16, wherein the removable material of plastic film 12 of polyimide is used and

Art Unit: 2822

acted as a molding stencil during molding of encapsulant 19 (Figs 7d, col 11, line 1 through col 12). Re claims 18-19, removing the material 12 is performed either prior to a singulation process to separate the package (Fig 7e-7f; col 11, lines 41-61, claim 18) or after a singulation process to separate the package (col 11, lines 62-64, re claim 19). Re claim 20, wherein the conductive material 15,16 comprises a metal frame sheet (Fig 2-4). Re claim 21, wherein the conductive material 16,15 comprises a metal leadframe (Figs 4,3). Re claim 22, wherein die attach pad 14 is not offset from the isolated conductive features 9 (Figs 5c). Re claim 23, wherein a single row of connectors 9 is formed around perimeter of the leadframe (Figs 5b,2). Re claim 24, wherein the metal frame comprise a metal sheet 16,15 (Figs 4,2). Re claim 26, wherein the removable material 12 covers substantially the entire bottom surface of the metal leadframe 14,9 (Figs 7a,).

Claim Rejections - 35 USC § 103

4. Claims 7-8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn (6,247,229) taken with Wyland (6,111,199) and Weng et al (5,972,234).

Glenn teaches (at Figs 2-7; col 3, line 18 to col 4; Fig 1, cols 5-6); a method for forming a package for an electrical device as applied to claims 1-6 above.

Re claims 7-8,17, Glenn already teaches (at col 3, lines 20-37) the removable material comprising a plastic, polyimide, wherein a soluble plastic adhesive that is removed by dissolving in a solvent, such as acetone (col 5, lines 48-54). Claim 7 recites the removable material comprising a water soluble adhesive. Claim 8 recites removing the removable material with deionized water. Claim 17 recites the removable material comprises polyimide and water soluble adhesive.

However, *Wyland et al* teach (at col 8, lines 1-10; col 7, lines 54-67) forming an adhesive resin film on a substrate, wherein polyimide, alkali-soluble resin, or water-soluble resin are alternatively used for forming the adhesive resin film. *Weng* teaches (col 5, lines 34-37,27-51; and col 4, line 25 through col 5, line 51) the removable material for electronic device comprises a polymeric-base material and a water soluble adhesive, wherein removing the removable adhesive material is performed with deionized water (as a pure water).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the removable material of polyimide of Glenn by providing a water-

Art Unit: 2822

soluble resin as a water soluble adhesive to the back of the polyimide, as taught by Wyland and Weng. This is because the substitute art recognized equivalent removable materials, as alternative materials, is within the level of one of ordinary skill in the art, wherein water-soluble resin material, plastic, or polyimide having adhesive backing are highly adhesive to the terminals of the lead frames, wherein, by using water soluble resin/adhesive, removing the removable materials can be easily and conveniently performed with water, as further taught by Weng, and less expensive, wherein with the use of deionized water, as a high purity water, ion contamination of the device is prevented and thereby improving reliability and quality.

5. Claims 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn (6,247,229) taken with Fjelstad (6,001,671).

Glenn teaches (at Figs 2-7; col 3, line 18 to col 4; Fig 1, cols 5-6) a method for forming a package for an electrical device as applied to claims 1-6,16,18,20-24,26 above. Glenn also teaches forming a single row of connectors 24 around perimeter of the metal frame sheet 13 (Figs 2-4; col 3, line 39 through col 4, line 45).

Re claim 25, Glenn already teaches forming a single row of connectors 24, but lacks having a multiple row. Re claim 27, Glenn already uses an adhesive material to couple the device to the die pad (Fig 5; col 4, lines 30-41), but lacks using a conductive epoxy.

However, re claim 25, Fjelstad teaches (at col 4, lines 5-10; Fig 1D-3) to arrange the pad connectors 110 around perimeter of the central region either in single rows or multiple rows. Re claim 27, Fjelstad also teaches (at col 4, lines 32-45) to use a thermally conductive epoxy to couple the device to the die pad.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the pad connectors around perimeter of the metal frame sheet of Glenn either in a single row or multiple rows as taught by Fjelstad. This is because of the desirability to arrange a plurality of pad connectors within a small area around perimeter of electronic device. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form couple the electronic device of Glenn to the die pad b using the thermally conductive epoxy as taught by Fjelstad. This is at least because of the desirability to provide a direct thermal pad to draw heat away from the electronic device.

Art Unit: 2822

6. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Glenn (6,247,229) taken with Yamaguchi (6,166,430).

Glenn teaches (at Figs 2-7; col 3, line 18 to col 4; Fig 1, cols 5-6) a method for forming a package for an electrical device as applied to claims 1-6,16,18,20-24,26 above.

Glenn already teaches removing the material 10 is performed prior to a singulation process to separate the package as recited in claim 18 (Figs 6-8; col 5, line 61 through col 6, lines 24), but lacks removing the material after a singulation process to separate the package, as alternatively recited in claim 19.

However, Yamaguchi teaches (at col 11, lines 41-64; Figs 7e-7f) removing the material 12 is performed either prior to a singulation process to separate the package (col 11, lines 41-61) or after a singulation process to separate the package (col 11, lines 62-64).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the material of Glenn either prior to or after a singulation process as taught by Yamaguchi. This is because the order of carrying out these processes is alternative and art recognized equivalent in fabrication and substitution so that the removable material can be removed from the electronic device in order to expose a portion of the metal leadframe for electrical connection.

Response to Arguments

** Applicant's amendment and remarks filed May 16, 2005 have been fully considered but they are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 8:30 Am to 5:00 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application should be directed to the receptionist whose telephone number is (703) 308-0956.

Oacs-15



Michael Trinh
Primary Examiner